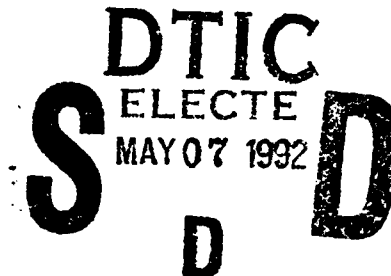AD-A250 112

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume III - Configuration Management
Part 8 - SCM Development Specification

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Integration Technology Services
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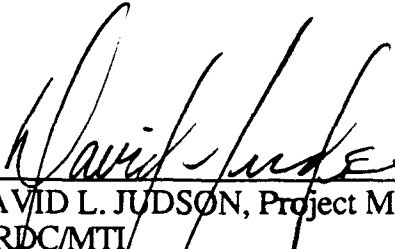Final Report for Period 1 April 1987 - 31 December 1990

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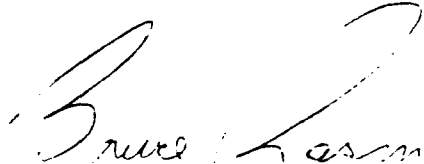
This technical report has been reviewed and is approved for publication.

This report is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations

_____   25 July 91
DAVID L. JUDSON, Project Manager   DATE
WRDC/MTI
Wright-Patterson AFB, OH 45433-6533

FOR THE COMMANDER:

_____   25 July 91
BRUCE A. RASMUSSEN, Chief   DATE
WRDC/MTI
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This development specification establishes the functional requirements of the IISS Software Configuration Management (SCM) system, which controls the storage and change of IISS source code and controls software releases.

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FOREWORD

This technical report covers work performed under Air Force
Contract F33600-87-C-0464, DAPro Project. This contract is
sponsored by the Manufacturing Technology Directorate, Air Force
Systems Command, Wright-Patterson Air Force Base, Ohio. It was
administered under the technical direction of Mr. Bruce A.
Rasmussen, Branch Chief, Integration Technology Division,
Manufacturing Technology Directorate, through Mr. David L. Judson,
Project Manager. The Prime Contractor was Integration Technology
Services, Software Programs Division, of the Control Data
Corporation, Dayton, Ohio, under the direction of Mr. W. A.
Osborne. The DAPro Project Manager for Control Data Corporation
was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test,
and demonstration of the Integrated Information Support System
(IISS). The IISS technology work comprises enhancements to IISS
software and the establishment and operation of IISS test bed
hardware and communications for developers and users.

The following list names the Control Data Corporation
subcontractors and their contributing activities:

SUBCONTRACTOR   ROLE

Control Data Corporation   Responsible for the overall Common
                             Data Model design development and
                             implementation, IISS integration and
                             test, and technology transfer of IISS.

D. Appleton Company   Responsible for providing software
                             information services for the Common
                             Data Model and IDEF1X integration
                             methodology.

ONTEK   Responsible for defining and testing a
                             representative integrated system base
                             in Artificial Intelligence techniques
                             to establish fitness for use.

Simpact Corporation   Responsible for Communication
                             development.

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Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface,and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

Table of Contents

SECTION 1

SCOPE

1.1 Identification

This specification establishes the development, test and qualification requirements of a computer program identified as the Software Configuration Management (SCM) subsystem. This is a configuration item of the Integrated Information Support System (IISS).

1.2 Functional Summary

SCM is used to control the storage and release of IISS software.

SECTION 2

DOCUMENTS

2.1 Reference Documents

1. General Electric Co.; Software Configuration Management User's Manual; 1 November 1985; CMU620124000.

2. General Electric Co.; Software Configuration Management User's Manual Supplement 1: IISS Release 2.0 Source Code, Alphabetical Listing; 25 July 1985; CMU620124000.

3. General Electric Co.; Software Configuration Management User's Manual Supplement 2: IISS Release 2.0 Source Code, Sorted by Subsystem and Subdirectory; 25 July 1985; CMU620124000.

4. General Electric Co.; Software Configuration Management Administrator's Manual; 1 November 1985; CMA620124000.

5. Interactive Systems Corporation; IS/Workbench for VAX/VMS Programmer's Guide Release 4.0; May 1983.

6. Interactive Systems Corporation; IS/Workbench for VAX/VMS User's Manual Release 4.0; April 1983.

2.2 Terms And Abbreviations

Digital Command Language (DCL): An interactive command language available under VAX/VMS.

Integrated Information Support System: (IISS), a computing environment used to investigate, demonstrate, test the concepts and produce application for information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Software Configuration Management (SCM): A set of programs, some of which interface with SCCS code, that are used to control the storage and release of IISS software.

Source Code Control System (SCCS): A system for controlling changes to files of text, providing facilities for storing, updating, and retrieving any version of a file. SCCS, a product of Interactive Systems Corporation, is a collection of programs that run under the IS/WB system.

<u>Software Problem Report (SPR)</u>: A problem reported by a Test Bed user using the SPR database facility of the IISS Test Bed. SPRs are assigned a unique number by the SPR system which is an automated problem report tracking procedure.

SECTION 3

REQUIREMENTS

3.1 Computer Program Definition

SCM is a system of code which stores current source code while preserving the history of changes to it. SCM controls changes to source code. SCM facilitates releases with automated functions. The SCM system consists of Source Code Control System (SCCS), some DCL code created by General Electric, and maintained and enhanced by BCS and a C program to interface between the DCL and SCCS.

3.2 Detailed Functional Requirements

Broad SCM functional areas are described in this section.

3.2.1 Storing Source Code

Source code is stored in a VAX/VMS directory [SIISS] in files that preserve a history of changes to it and have associated with each change the release number, the date, the SPR number, and the person's account name. This function is carried out with NEWITEM, CHECKOUT, and RETURN.

3.2.2 Controlling Changing Of Source Code

Concurrency of making changes to the same file is avoided by the CHECKOUT function. When a file is checked out, a file is created in [CMDB.OUT] to keep a record of information on the checked out file. A file checkout is not allowed if [CMDB.OUT] already contains an entry with that file name.

Checkouts and checkprints are only allowed on the most recent version of a file. This is to avoid confusing the normal user who is interested only in the most recent version.

The specification of release number at the time of RETURN is allowed. This makes it possible to have concurrent development for different releases on different code.

3.2.3 Document Reasons For Newitems And Checkouts

To document the reasons for software changes, it is required that an SPR exist and is referenced by every NEWITEM and CHECKOUT. NEWITEM is used to put a new IISS software module under configuration control. CHECKOUT delivers a current copy of an existing software module for revision and only allows one development analyst to have a particular module checked out at a time.

3.2.4 Viewing Current Checkouts

Users are able to find out who has currently checked out a given file by using WHOHAS and what files are currently checked out by a given user by using HASWHO.

3.2.5 Creating Releases

VAX and IBM releases are created as automatically as possible from the stored source code. New releases are created from scratch in an empty release directory.

3.2.6 Changing Past Releases

The ability to change past releases was felt to be a desirable functionality. It was assumed that this could be done if it were possible to create a branch in the source code history file at the correct release level. In order to make this possible, an SCCS flag was added to the files in [SIISS] to create null nodes at any release levels that had had no changes. However this functionality was never entirely set up so that branching would be allowed. This was for two reasons. Branching would be confusing to most users and would lead to more inadvertent errors in changing files. And since in practice there are many changes allowed in the relocation, renaming, deletion, or addition of files, past releases could not be recreated using the normal release procedures anyway. In a practical sense the only way to change a past release, given the current SCM practices, is to modify source code from a release tape.

3.3 Program Organization

The organization of SCM software will be described in this section in three parts: SCCS code, SCM user functions, and SCM administrative functions.

3.3.1 SCCS Code

The lowest level of visible SCM code is SCCS code. The SCCS commands that are used directly by SCM are ADMIN, GET, and DELTA. These commands are called only from CHKOUT.COM, CHKPRT.COM, RETURN.COM, and NEWITEM.COM. For detailed descriptions of the SCCS functions, see the referenced IS/Workbench manuals.

ADMIN is called by NEWITEM to create a new SCCS file. The release number, SPR number, person doing the newitem, and the date are all documented in the header section of the SCCS file.

GET is called by CHECKOUT and CHECKPRT in two different ways, with and without a -e keyletter. GET retrieves a readable version of the file. When the -e keyletter is used, the file may be subsequently changed with the DELTA function. At the time the -e keyletter is used, the release number that the change is to go in for is specified.

The functionality of specifying release number at the time of doing a RETURN was implemented by calling GET without the -e keyletter in CHECKOUT, then calling GET with the -e keyletter during RETURN, prior to the DELTA call which puts in the change. Thus a CHECKOUT is the same as a CHECKPRT except that during CHECKOUT, a file is created in [CMDB.OUT] to reserve the file so that it cannot be checked out concurrently.

The SCCS functions are all called through an interface program, INTER.C. This program calls the SCCS functions by creating a detached process with the UIC of SIISS.

The executables for INTER, DELTA, ADMIN, and DIFF are installed with special privileges in order to avoid protection problems that were encountered due to accessing CM from different UIC groups. The latter three have SYSPRV, and INTER has SYSNAM, DETACH, TMPMBX, and NETMBX.

3.3.2 SCM User Functions

A detailed description of how to use the user functions is provided in the SCM User's Manual.

The SCM user functions are run from the [IISSCM] directory. Most of these functions are standalone command procedures. The following is a list of all user functions, each followed by a list of called functions, if any. SCCS functions are indicated in capital letters. The functions that are only used by calls from other functions are in parentheses. The purpose of each module is given on following lines.

> chkout.com - cvtdir,whohas,inter,valprob,GET
>
>> Obtain current copy of a file from SCM prior to changing it.
>
> chkprt.com - cvtdir,inter,GET
>
>> Obtain current copy of a file from SCM for reading.
>
> cmhelp.com
>
>> Give parameters for SCM functions, for expert mode.
>
> (cvtdir.com)
>
>> Convert a directory from VMS format to UNIX format for SCCS.
>
> defcm.com
>
>> Define the SCM functions (run by the SYSTARTUP command file).

dispose.com - whohas

    Cancel a checkout without returning it to SCM.

haswho.com

    Find out what files are checked out by an
      individual.

(inter.exe)

    Interface with SCCS code, overriding SCCS
      protections.

newitem.com - cvtdir,inter,valprob,ADMIN

    Enter new file into SCM.

pspr.com - pstats,valprob

    Print a Software Problem Report.

(pstats.com) - wrtdet,wrthdr

    Print a list of checked out files and returned
      files for an SPR .

return.com - cvtdir,whohas,inter,GET,DELTA

    Put checked out file back into SCM with its
      changes.

rslspr.com - pstats,valprob

    Close out (resolve) a Software Problem Report.

spr.com

    Open a new Software Problem Report.

(valprob.com)

    Delete leading zeroes from an SPR number and
      check that the number is valid.

whohas.com

    Find out who has checked out a particular file.

(wrtdet.com)

    Format an information line for PSPR.

(wrthdr.com)

    Write header information for PSPR.

3.3.3 SCM Administrative Functions

A detailed description of how to use the administrative functions is provided in the SCM Administrator's Manual.

The SCM administrative functions, including the VAX release procedures, are run from the [IISS.COM] directory. The IBM release procedures are analogous and are run from the [IISSIBM.COM] directory. Most of these functions are standalone command procedures. The following is a list of the administrative functions in [IISS.COM], each followed by a list of called functions, if any. The purpose of each module is given on following lines.

bldnddl.com

Create command files to compile and link NDDL files.

crellst.com

Create a link command file for RP main programs.

cvtnew.com

Enter files from NEWITEM.DAT into CI.DAT.

moveall.com

Move all needed files from IISS to TIISS for release testing.

updci.com

Update the CI.DAT file.

vbldcom.com - cvtdir (in [IISSCM])

Generate all needed command files for a given subsystem.

vcredo.com

Create a command file to compile, object library replace, and link a subsystem.

vcreget.com

Create a command file to do all gets and include library replaces.

vdelall.com - vdelete

Call vdelete for all subsystems.

vdelete.com

Delete files from IISS and recreate empty object libraries for a subsystem.

vdorun.com

    Start a batch job to compile and link a subsystem.

vend.com

    Update RELNUM.DAT at the end of a release.

vinit.com

    Compile and library relace the ERRLOG subsystem
      files needed for linking the IPC subsystem.

vstart.com - cvtnew

    Create a release directory and update CI.DAT with
newitems.

vsubsys.com

    Sort CI.DAT into separate temporary files for each
      subsystem.

3.4 Data Base Requirements

    SCM is organized to require numerous data files, which are
stored in [CMDB]. Most of the files are keyed to an SPR number
and contain information relating to that SPR. The following
provides a brief description of these files, where   refers to
the SPR number:

1. p .xrf - files checked out with SPR

2. pd .xrf - problem description

3. r .xrf - returns, newitems, and disposed (canceled)
               files with SPR

4. rd .dat - resolution description (if SPR resolved)

5. spr .dat - basic information on SPR (date, person
               filing, etc.)

6. spr .lis - file created during PSPR, a report on SPR
               status and files

The other data files in [CMDB] are the following:

1. "person's name".xrf - list of all files checked out by
               the person

2. ci.dat - the primary source code data file, used during
               releases

3. newitem.dat - each record is information about a
               newitem

4. return.dat - each record is information about a
    returned file

5. cancel.dat - each record is information about a
    disposed (canceled) file

6. user.dat - list of privileged SCM users, can do
    newitems and checkouts

7. userr.dat - list of users with read privilege, can do
    checkprts

Some temporary data files are stored in [CMDB.OUT]. A file
is created there whenever a checkout is done. The file is given
the same name as the checked out file, except that if it is a
system-dependent file the host letter is appended to the
filename (V for VAX, I for IBM). The file contains information
needed when the return is done, such as the SPR number and the
SIISS subdirectory for the file.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1 Introduction And Definitions

The assurance of software quality involves design considerations, testing, and debugging. "Design" involves the determination of coding standards, modular structure, data structures, and data storage for the software system. "Testing" involves running the software with a sufficient variety of inputs to assure the correctness of all possible paths through the code. "Debugging" is the process of isolation and correction of errors.

4.2 Computer Programming Test And Evaluation

The quality assurance of SCM software is handled differently from other IISS software. The SCM software is not part of IISS releases and is not used as part of the IISS product. Therefore it is not systematically tested with other IISS software. Since it is a tool used by the IISS development team to control software change and do releases, the code is constantly being tested by being used. When a user module is modified due to a required change in functionality or due to the need to solve a bug, the module is tested in a SCM development area prior to being moved to the SCM production area. When an administrative function is modified, it is tested by the SCM Administrator when it is used during the next release.

SECTION 5

PREPARATION FOR DELIVERY

The implementation site for the constructed software is the ICAM Integrated Support System (IISS) Test Bed site located at the Arizona State University, Tempe, Arizona. The software associated with each FDFE release is delivered on a medium which is compatible with the IISS Test Bed. The release is clearly identified and includes instructions on procedures to be followed for installation of the release.

The IISS Release 2.3 software is available in both object and source code and delivered on magnetic tape media. The tapes are 2400' reels and the IISS release code is inscribed at 1600 bpi. Instructions for installing IISS from magnetic tape onto either a VAX VMS or IBM MVS system is contained in the VAX or IBM Installation Guides:

Volume III, Part 11, CI# OM 620324001, VAX Installation Guide for Executable Code

Volume III, Part 17, CI# OM 620324003, VAX Installation Guide for Source Code

Volume III, Part 12, CI# OM 620324002, IBM Installation Guide

SECTION 6

NOTES

Please refer to the Software Availability Bulletin, Volume III, Part 16, CI# SAB620326000, for current IISS software and documentation availability.